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# Fabric Makes Electricity from Movement to Power Wearables

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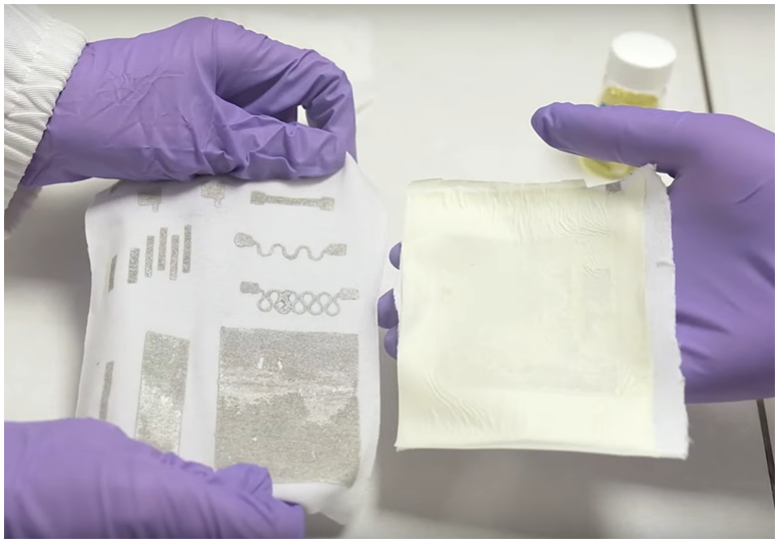

Scientists at Nanyang Technological University, Singapore, have created a wearable fabric that generates electricity from our body movements. The fabric could assist in powering medical wearables and other mobile diagnostic or therapeutic devices. The fabric contains stretchable polymers that generate electricity when bent, pressed, or brushed, based on piezoelectric and triboelectric effects. The fabric is highly robust and can withstand regular crumpling and washing with no loss of performance. So far, the researchers have shown that it can provide a stable supply of energy for up to five months.

Medical wearables have expanded the possibilities of long-term health monitoring, and allow patients to live their lives as normal while still keeping track of important health parameters. However, as with all electrical equipment, they will need regular charging or battery changes. What if we could charge them on the go, using our bodies as a source of energy?

This is the philosophy behind this latest technology, which seeks to harvest electricity from our body movements. “Despite improved battery capacity and reduced power demand, power sources for wearable devices still require frequent battery replacements,” said Lee Pooi See, one of the developers of the new fabric. “Our results show that our energy harvesting prototype fabric can harness vibration energy from a human to potentially extend the lifetime of a battery or even to build self-powered systems. To our knowledge, this is the first hybrid perovskite-based energy device that is stable, stretchable, breathable, waterproof, and at the same time capable of delivering outstanding electrical output performance.”

To create the stretchable electrodes, the researchers screen-printed a mixture of silver and a rubbery material called styrene-ethylene-butylene-styrene (SEBS). They then integrated the electrodes into a nanofiber fabric containing a polymer called poly(vinylidene fluoride)-co-hexafluoropropylene (PVDF-HPF). PVDF-HPF creates an electrical charge when it is stretched, bent, or squashed, forming the basis of the electrical generation. The material also contains lead-free perovskites.

“Embedding perovskites in PVDF-HPF increases the prototype’s electrical output,” said Jiang Feng, another researcher involved in the study. “In our study, we opted for lead-free perovskites as a more environmentally friendly option. While perovskites are brittle by nature, integrating them into PVDF-HPF gives the perovskites exceptional mechanical durability and flexibility. The PVDF-HPF also acts an extra layer of protection to the perovskites, adding to its mechanical property and stability.”

See a video about the fabric below.


Study in *Advanced Materials*: Stretchable, Breathable, and Stable Lead-Free Perovskite/Polymer Nanofiber Composite for Hybrid Triboelectric and Piezoelectric Energy Harvesting

Via: Nanyang Technological University

Conn Hastings

Conn Hastings received a PhD from the Royal College of Surgeons in Ireland for his work in drug delivery, investigating the potential of injectable hydrogels to deliver cells, drugs and nanoparticles in the treatment of cancer and cardiovascular diseases. After achieving his PhD and completing a year of postdoctoral research, Conn pursued a career in academic publishing, before becoming a full-time science writer and editor, combining his experience within the biomedical sciences with his passion for written communication.